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ABSTRACT

Additive and interactive models of attitudes and normative beliefs were compared in a survey of smoking, drinking, and drug use among post-primary students from Dublin, Ireland. It was hypothesized that contingent consistency interactions would be found: (1) when predicting drug use, but not smoking or alcohol use; (2) for younger, but not older students; (3) for normative beliefs about peers, but not about parents; and (4) for normative beliefs about substance use by others, but not about verbal approval. Questionnaires focusing on beliefs, attitudes, and behaviors related to cigarette smoking were completed by 2,927 students. Questionnaires focusing on beliefs, attitudes, and behaviors related to alcohol and drugs were completed by 2,782 students. Contrary to expectations, significant interactions were found for all three target behaviors and regardless of the age of the students. These interactions primarily involved attitudes and normative beliefs about peer substance use. Interactions involving other normative beliefs generally were not significant. Contingent consistency effects may result from greater access to tobacco, alcohol, and other drugs on the part of adolescents who have friends involved in smoking, drinking, and other durg use. A reference list and six data tables supplement this document. (Author/NB)

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Attitude-Normative Belief Interactions in Predicting Adolescent Substance Use

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Paper presented at the annual meeting of the

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Abstract

Additive and interactive models of attitudes and normative beliefs were compared in a survey of smoking, drinking, and drug use among post-primary students from Dublin, Ireland. It was hypothesized that contingent consistency interactions would be found (a) when predicting drug use, but not smoking or alcohol use; (b) for younger, but not older students; (c) for normative beliefs about peers, but not about parents; and (d) for normative beliefs about substance use by others, but not about verbal approval. Contrary to expectations, significant interactions were found for all three target behaviors and regardless of the age of the students. These interactions primarily involved attitudes and normative beliefs about peer substance use. Interactions involving other normative beliefs generally were not significant. It is suggested that contingent consistency effects may result from greater access to tobacco, alcohol, and other dugs on the part of adolescents who have friends involved in smoking, drinking, and other drug use.

Attitude-Normative Belief Interactions in Predicting Adolescent Substance Use

Most contemporary attitude theories explicitly recognize the importance of interpersonal influences on behavior and incorporate normative beliefs or similar constructs to represent such influences (e.g., Ajzen & Fishbein, 1980; Triandis, 1980; Bagozzi, 1982). However, these theories uniformly assume that the effects attitudes and normative beliefs are independent of one another and are additive. The following simple equation derived from the theory of reasoned action (Ajzen & Fishbein, 1980) summarizes the traditional formulation of the relationships among attitudes, normative beliefs, and behavior:

$$B = \underline{w}_1 A + \underline{w}_2 NB \qquad (1).$$

In this equation, B represents behavior, A attitude, and NB normative beliefs. $\underline{W}_1$ and $\underline{w}_2$ are weights indicating the relative importance of attitudes and normative beliefs for the behavior in question. This model explicitly states that the effects attitudes and normative beliefs are independent of one another and that these variables contribute to behavior in a simple additive fashion.

Although additive models have proven reasonably adequate for predicting many behaviors, such models may not be complete. Specifically, it has been suggested that the effects of attitudes and normative beliefs are interdependent and interactive in some situations (e.g., Liska, 1984; Andrews & Kandel, 1979). An interactive model of attitudes and normative beliefs can be represented by the following equation:

$$B = \underline{w}_1 A + \underline{w}_2 NB + \underline{w}_3 (AxNB) \qquad (2).$$

Equation 2 differs from equation 1 only in that it contains an additional term (AxNB) representing the joint effects of attitude and normative beliefs and a weight ($\underline{w}_3$) representing the relative contribution of this joint effect to behavior. The present paper investigates the extent to which an interactive model of attitudes and normative

beliefs increases the prediction of adolescent smoking, drinking, and drug use behaviors above and beyond an additive model. In addition, potential determinants of when such interactions will occur are considered.

Theoretically, attitude-normative belief interactions can take any of a number of possible forms (cf. Grube, Morgan, & McGree, 1986). However, contingent consistency is the type of interaction that appears to be most likely and that has attracted the most research attention (e.g., Liska, 1984). Under conditions of contingent consistency, the presence of both a supportive attitude and supportive normative beliefs are necessary for the expression of a behavior (Andrews & Kandel, 1979). If either is unsupportive, then the behavior is unlikely to occur. Contingent consistency thus represents a special case of equation 2. Specifically, assuming that higher scores on A and NB represent more favorable attitudes and normative beliefs toward the target behavior, then contingent consistency can be said to exist when w_3 takes a positive value.[1]

Although the contingent consistency hypothesis is intuitively appealing, research on this issue has been inconclusive. Many of the early studies (e.g., Fendrich, 1967; Warner & DeFleur, 1969; Acock & DeFleur, 1972; Liska, 1974) can be questioned on methodological and substantive grounds. It has been noted that the designs and analyses used in many of these studies have been inappropriate for testing the contingent consistency hypothesis and, moreover, that the interactions reported in them have been quite small, often accounting for less than 1% of the variance in the target behavior (e.g., Susmilch, Elliot, & Schwartz, 1975; Schuman & Johnson, 1976). Among more recent studies, contingent consistency interactions have obtained in some cases, but not others. Thus, significant interactions were found in predicting marijuana use among young adolescents (Andrews & Kandel, 1979), in predicting drinking among adults (Rabow, et al., 1987), and in predicting smoking among grade school students (Grube, Morgan, & McGree, 1986). However,

significant contingent consistency effects were not found in predicting soft drink or dress choices among college students (Bagozzi & Schnedlitz, 1985) or marijuana use among older adolescents (Andrews & Kandel, 1979). Moreover, in one study (Grube, Morgan, & McGree, 1986) both contingent consistency effects and reactance effects were found in predicting smoking among college students. That is, smoking was most frequent in the presence of a favorable attitude and supportive normative beliefs about peers, but also when attitude was favorable, but parents were seen to disapprove of smoking.

One possible reason for the apparent inconsistencies in these findings is the fact that the theoretical basis for contingent consistency interactions is not well established. With only two exceptions (Rabow, et al., 1987; Andrews & Kandel, 1979) the available studies have not attempted to determine the circumstances necessary for such interactions to occur. As a result, it is difficult to assess the relevance of many of the extant studies. In some cases, the failure to find contingent consistency interactions may be the result of a failure to meet the conditions necessary for this effect.

It is suggested here that three factors may be important determinants of when contingent consistency effects will occur: (a) the social risk involved in the target behavior, (b) the personal importance of the referents who are the targets of the normative beliefs, and (c) whether the normative belief measures focus on the behavior of others or approval of others.

It is proposed that contingent consistency effects are more likely when the target behavior has a high probability of entailing social or personal costs and when those costs are potentially large. Under these circumstances an individual will act upon a favorable attitude only if there is a reasonable certainty that the behavior in question will be approved by personally significant referents. Behaviors that are illegal, widely socially disapproved, or generally perceived as deviant should be more

likely to show contingent consistency effects than other behaviors. Thus, soft drink and dress choices, which entail little social risk, should not show contingent consistency effects while adolescent smoking, drinking, and drug use should.

A similar theoretical point was made by Andrews and Kandel (1979) in explaining the fact that they found contingent consistency effects in predicting marijuana use among younger but not older adolescents. These authors suggested that contingent consistency effects are most likely for behaviors that are novel or at their initial stages of development. Presumably such behaviors entail greater social risk than behaviors that are common or well established. If it is assumed that smoking, drinking, and drug use are relatively novel or experimental for young adolescents, but less so for older students, then it follows that contingent consistency effects would be more likely among younger as opposed to older adolescents.

It also is proposed that contingent consistency effects are likely to occur only for normative beliefs regarding personally important referents. The fact that significant contingent consistency interactions were not found in some studies may be attributable to the fact the salience of various reference groups was not taken into account in measuring normative beliefs. Most studies have simply combined measures across referents or have used measures of generalized social approval. Among adolescents, the distinction between perceptions of peers and perceptions of other referents may be especially relevant. Friends, for example, may be more important for adolescents than are parents or other adults as sources of social reinforcement. As a result, beliefs about friends may be more likely to be involved in contingent consistency effects than would beliefs about parents or other adults.

Finally, the failure to find substantively meaningful interactions in some studies may be a result of shortcomings in conceptualization of normative beliefs. Most of the available studies have focused only on perceived approval of others as an indicator of normative influences (e.g., Bagozzi & Schnedlitz, 1985) or else have

combined measures of perceived approval and behavior of others into a single indicator (Rabow, et al., 1987). It is proposed here that beliefs about the behaviors of others may be more likely to be involved in contingent consistency interactions than are beliefs about the verbal approval of others.

There is some evidence that behavioral modelling generally may be more important for eliciting behavior than are verbal exhortations (e.g., Bryan & Walbek, 1970), especially for adolescent smoking, drinking, and drug use (e.g., Grube, McGree, & Morgan, 1984; Grube Morgan, & McGree, 1986; Grube & Morgan, 1986). In these situations, the behaviors of others may be seen to convey more information than verbal prescriptions or proscriptions about what is acceptable, especially when words and deeds are conflicting. Availability or opportunity also may be a factor in attitude-normative belief interactions. An adolescent may have favorable attitudes toward tobacco, alcohol, or drug use, but cannot act upon these attitudes because of lack of opportunity to use these substances or limited access to them. Having a friend or parent who smokes, drinks, or uses drugs may increase the opportunities a young person has for obtaining and using these substances and thus may increase the relationship between attitude and behavior (cf. Rabow, et al., 1987).

On the basis of social risk considerations, it was hypothesized that contingent-consistency interactions would be more likely (a) among younger students as opposed to older students and (b) for drug use as opposed to alcohol and tobacco use. It also was hypothesized that such interactions would be more likely for normative beliefs about (a) peers as opposed to parents and (b) the behaviors of others as opposed to the approval or disapproval of others. These hypotheses were investigated here using survey data concerning smoking, drinking, and drug use obtained from post-primary students in Dublin Ireland.

Method

Procedures

Overview. Data were collected on two occasions one month apart during the Spring of 1984 using anonymous self-administered surveys. The questionnaire at first phase focused on beliefs, attitudes, and behaviors relating to cigarette smoking and the questionnaire at the second phase focused on alcohol and drugs.

Subjects. The target population for the surveys consisted of post-primary students within the greater Dublin, Ireland area. For each class level a sample of schools was obtained, stratified for gender composition, size, and type of school (secondary, comprehensive/community, or vocational).[2] In all, 24 schools were thus selected and participated in the research. Within each school all students from the predetermined class level were considered eligible for inclusion in the study.

Data were obtained from 2927 students at the first phase and 2782 students at the second phase of the study, representing an average of 90% of the eligible students enrolled in the participating schools at the time.[3] The respondents were nearly evenly divided between males (50.1%) and females (49.9%). They ranged in age from about 10 years to 21 years old, but the vast majority (99.7%) fell between 12 and 18 years and the median age was 15.3 years old.

Survey administration. It was arranged with the participating schools for all students in the selected class levels to be tested in their regular classrooms or another group setting. The survey sessions were supervised by trained research personnel and lasted about 40 to 50 minutes. Before each session, one of the research staff explained that the study was concerned with smoking, drinking, and drug use and assured the students as to the complete anonymity and confidentiality of their responses. The students were asked not to put their names anywhere on the survey materials and the need for truthful answers was emphasized. These verbal instructions were reiterated on the inside cover of the questionnaire. Previous

research suggests that conditions of anonymity and confidentiality can lead to responses that are as reliable and valid as those obtained with more cumbersome techniques such as the bogus pipeline or randomized response (Akers, et al., 1983; Hansen, Malotte, & Fielding, 1985; Murray & Perry, 1987).

Measures

Smoking, drinking, and drug use. Smoking was measured by asking the students to indicate on an eight-point scale how many cigarettes (none -- more than 20) they smoked each day, on the average, during the month prior to the survey. Drinking was similarly ascertained with a series of 7 point scales that asked the students how many times (none -- more than 10) they had taken a whole drink of cider, beer, wine, or spirits during the previous month. A index of drinking behavior was calculated by taking the mean of these items (α = .73). Finally, drug use was measured with a similar series of scales asking the students how often they had use each of nine drugs (inhalants, marijuana, cocaine, heroin, LSD, barbiturates, speed, psilocybin, cough syrup) to get "high" during the past month. They also were asked if they had used any other any other drugs not included on the list and to specify what these were. Because drug use was relatively rare, an index of this behavior was calculated by simply summing the number of different drugs each student reported using (α = .78).

Attitudes. Attitudes toward smoking, drinking, and drug use were measured with five point scales. For smoking three items were included in these scales (pleasant-unpleasant, enjoyable-unenjoyable, like-dislike). Only two items were used for measuring attitudes toward drinking and drug use (pleasant-unpleasant, like-dislike). In each case, the items were personalized and specifically targeted at the respondents own behavior (e.g., "Do you think smoking cigarettes would be a pleasant thing for you to do, or an unpleasant thing for you to do?"). The internal reliabilities

for these measures ranged from .76 for drug use attitude to .86 for both smoking and drinking attitude.

Normative beliefs. Unlike the approach advocated by some contemporary theories of attitudes and beliefs (e.g., Ajzen & Fishbein, 1980), the present study focused on both the perceived disapproval of others and on the perceived behavior of others. Perceived disapproval was measured by asking the students the extent to which each of four significant referents (mother, father, best friend, other good friends) would disapprove if the respondent were to engage in each of the target behaviors. These items used five point scales ranging from disapprove extremely to would not disapprove. Perceived smoking and drinking behavior by significant others was measured by asking the students to mark on five point scales how many cigarettes they thought each of these same referents smoked each day (does not smoke-more than 30) and how many times they drank alcohol each week (none-every day). Perceived drug use was ascertained only for best friend and other friends and the same scale was used as for drinking. For the most part, the reliability of these scales were very good with a median value of .83. However, the reliability coefficient for perceived parental smoking was quite low (.44), indicating that the results for this variable should be treated with some caution. The reliabilities for the remaining normative belief scales ranged from .67 for parental drinking to .90 for both parental and peer approval of drinking and drug use.

Results

Social risk

The perceived social risk related to smoking, drinking, and drug use was not directly ascertained. However, one indicator of the relative risk associated with these behaviors is the extent to which they are generally believed to be disapproved by significant others. Table 1 compares the perceived disapproval of smoking, drinking, and drug use parents and friends and gives the relevant Friedman's tests. The data

shown in this table indicate that drug use was the behavior seen to be most disapproved. Smoking and drinking were believed to be less disapproved of and do not differ significantly from one another in this regard.

Age-related differences in social risk were investigated by comparing the extent to which smoking drinking, and drug use were seen to be disapproved by three groups of students: (a) those 14 years old or younger, (b) those 15 to 16 years old, and (c) those 17 years old or older. Table 2 shows the mean rankings of the respondents on perceived disapproval of smoking, drinking, and drug use by age group along with the relevant Kruskal-Wallis statistics. For smoking and drinking, substantial age-related differences are found. Younger students routinely perceived less social support for these behaviors than did older students. Interestingly, the trends do not appear to be linear. Rather, the biggest change occurs between the youngest group of students and those 15-16 years old. For drug use, the age-related differences in perceived disapproval are considerably smaller than for the other two behaviors. Although significant age-related effects obtain for disapproval by mother, best friend, and other good friends, drug use behaviors generally are seen to be strongly disapproved regardless of the students' ages.

Insert Tables 1 and 2 About Here

Overall, these analyses indicate that drinking and smoking are seen to be less disapproved than is drug use. Younger, as opposed to older, students, also perceived all of these behaviors to be more disapproved. These findings are consistent with the assumption that smoking and drinking entail less social risk than drug use and that younger students face more social risk for these behaviors than do older students.

Importance of parents versus peers as referents

The relative importance of parents versus peers as referents for students was investigated by asking them to rate on five point scales how important (not at all important-very important) it was for them personally to get along with their mother, father, best friend, and other good friends. A Friedman's test comparing the mean ratings given to parents with that given to friends indicated that peers were significantly more important as a reference group for these students, $x^2(1, N = 2857) = 325.27, p < .001$. The mean rankings of peers and parents on this measure were 1.67 and 1.33, respectively. These results are consistent with the assumption that peers represent a more important reference group for these adolescents than do parents.

Predicting smoking, drinking, and drug use

A hierarchical regression procedure was used to test for the presence of attitude-normative belief interactions. On the first step a simple additive model was tested by entering the attitude and normative belief main effects to predict smoking, drinking, and drug use. On the second step, the interactive model was tested by adding the attitude x normative belief scale product terms to the equations. The statistical and substantive significance of the increase in the explained variance resulting from the addition of the interactions was examined to determine the adequacy of the additive versus the interactive model.[4] Once a final model was obtained, the regression coefficients from the resulting equations were examined to determine which, if any, of the specific interactions were significant and to ascertain the nature of these interactions.

For the purposes of investigating the hypotheses concerning social risk, separate analyses were conducted for three age groups: (a) those who were 14 years old or younger, (b) those who were 15 to 16 years old, and (c) those who 17 years old or older. Similarly, separate analyses also were carried out for smoking, drinking, and

drug use. In addition, all scale scores were centered about their respective means as is recommended when including multiplicative terms in a regression analysis (e.g., Fisher, 1988; Mardsen, 1981).

Additive versus interactive models. Table 3 summarizes the predictions of smoking drinking, and drug use from the additive and interactive models. The additive models predicted these behaviors relatively well for all three age groups. On the average, a simple additive model accounted for 37.6% of the variance in smoking, 32.7% of the variance in drinking, and 41.1% of the variance in drug use. However, with the exception drug use by the youngest group, the addition of the interactive terms to the models led to statistically and substantively significant increases in the predictions. On the average, the addition of the interactive terms to the equations increased the R^2 values by .052. In the case of drug use by the youngest students, the R^2 increase associated with the addition of the interactions was statistically significant, but so small (.013) as to be substantively meaningless. In general, however, these analyses provide strong evidence for the interactive over the additive model.

Social risk. It had been hypothesized that attitude-normative belief interactions would be more likely to occur (a) for drug use, as opposed to alcohol or tobacco use and (b) for younger, but not older students. The analyses shown in Table 3 provide no support for either of these hypotheses. If anything, the interactions tended to be somewhat larger for the less risky behaviors and for older students. The average increase in R^2 was .067, .058, and .045 for smoking, drinking, and drug use, respectively. On the average, the interactive model increased the R^2 value by .039 for the students 14 years old and under, .065 for the 15-16 year olds, and .051 for the students 17 years old or older.

Insert Table 3 About Here

The regression coefficients for the final models predicting smoking, drinking, and drug use are displayed in Tables 4, 5, and 6. An examination of these coefficients reveals that the interaction terms all consist of contingent-consistency effects. That is, in each case, the behavior in question was most likely or most frequent when attitudes and normative beliefs were both favorable and consistent with one another, and were relatively infrequent otherwise.

Insert Tables 4,5,and 6 About Here

Focus of normative belief measures. It was hypothesized that attitude-normative belief interactions would be larger for beliefs focused on peers rather than parents and for beliefs focused on behavior as opposed to approval. Consistent with these hypotheses, 10 of the 12 significant interaction terms, were focused on peers and 9 of them were focused on perceived behavior. Interestingly, 8 of the 12 significant interaction terms involved normative beliefs regarding peer behavior. An examination of the standardized regression coefficients (ß) also shows that these attitude x peer behavior interactions are routinely the largest, generally being 2 to 3 times the size of the significant interactions involving other normative beliefs. One exception to this occurs for drug use by the older students in which the attitude x parental approval interaction approaches that for attitude x peer drug use. Additional regression analyses indicated that a more restrictive model consisting of the additive terms plus only the attitude x peer behavior interactions generally predicted these behaviors as well as the model containing all of the interaction terms. Moreover, models containing only the interactions involving only approval and

parental behavior generally did not improve the predictions above and beyond the additive model. Thus, it appears that perceptions of peer behavior, a measure of normative belief neglected in most attitude theories, is the primary contributor to the significant contingent-consistency interactions found here.

Discussion

The present research compared a traditional additive model of attitudes and normative beliefs with an interactive model in predicting adolescent smoking, drinking, and drug use. In eight of nine analyses, the addition of attitude-normative belief interaction terms to the regression equations led to statistically significant and substantively meaningful increases in the prediction of these behaviors. Thus, the data provide strong evidence for an interactive model of attitudes and beliefs over a simple additive model. As expected, a consideration of the individual regression coefficients indicated that the interactions uniformly comprised contingent consistency effects. That is, smoking, drinking, and drug use among these adolescents were most frequent when both attitudes and normative beliefs were supportive, but relatively infrequent otherwise.

It was hypothesized that attitude-normative belief interactions would be most likely under conditions of high social risk. Specifically, it was expected that contingent consistency effects would be found (a) for drug use, but not drinking or smoking and (b) for younger, but not older students. No evidence for these hypotheses was found. Rather, significant attitude-normative belief interactions were obtained regardless of target behavior or age. If anything, the interactions were stronger for the least risky behavior (smoking) and for older students. It also was hypothesized that contingent consistency interactions would be most likely for beliefs about the behaviors of others and as opposed to the approval of others and for beliefs about peers as opposed to parents. Support for both of these hypotheses was found. Moreover, it was found that the significant R^2 increases associated with the

interactive model were almost entirely a result of the joint effects of attitude and perceived peer behavior. Perceived approval and perceived behaviors of parents were rarely involved in significant interactions. The fact that most of the relevant research and most traditional theories of attitudes and beliefs (e.g., Ajzen & Fishbein, 1980; Bagozzi, 1982; Triandis, 1980) have focused on perceived approval of others and not on perceived behavior of others, may explain why the research findings on contingent consistency effects has been inconclusive.

The finding that social risk factors were not important in determining when contingent consistency effects occur leaves open the question of the theoretical basis for these effects. Given that the interactions found here routinely involved perceptions of peer behavior, suggests that accessibility may be an important factor in determining when contingent consistency will occur (cf. Rabow, et al., 1987). Having friends who smoke, drink, or use drugs may increase availability of these substances or exposure to situations in which they are used. This increased accessibility would then provide the opportunity for those adolescents with a favorable attitude to act upon that predisposition. When accessibility is limited, it may not be possible for adolescents to smoke, drink, or use drugs regardless of their attitudes.

Unfortunately, the present study cannot provide a definitive test of the availability hypothesis. Further research will be necessary to clarify this point. However, the data presented here do suggest that contemporary theories of attitudes and beliefs should be modified to include the possibility of attitude-normative belief interactions. These interactions are important for two reasons. From a theoretical standpoint, they help us better understand how belief systems are organized and how cognitive and environmental variables may interact to influence behavior. From a practical standpoint, they allow for the more precise prediction of behavior. In the case of adolescent substance use behaviors, these interactions may be particularly

important because they provide a more accurate identification of young people at risk for smoking, drinking, and drug use.

References

Acock, A. C. & DeFleur, M. L. (1972). A configurational approach to contingent consistency in the attitude-behavior relationship. American Sociological Review, 37, 714-726.

Ajzen, I. & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall.

Akers, R. L., Massey, J., Clarke, W., & Lauer, R. M. (1983). Are Self-Reports of Adolescent Deviance Valid? Biochemical Measures, Randomized Response, and the Bogus Pipeline in Smoking Behavior. Social Forces, 62, 234-251.

Andrews, K. H. & Kandel, D. B. (1979). Attitude and behavior: A specification of the contingent-consistency hypothesis. American Sociological Review, 44, 298-310.

Bagozzi, R. P. (1982). A field investigation of causal relations among cognitions, affect, intentions, and behavior. Journal of Marketing Research, 19, 562-584.

Bagozzi, R. P. & Schnedlitz, P. (1985). Social contingencies in the attitude model: A test of certain interaction hypotheses. Social Psychology Quarterly, 48, 366-373.

Bryan, J. H. & Walbek, N. H. (1970). Preaching and practicing generosity: Some determinants of sharing in children. Child Development, 41, 329-354.

Fendrich, J. M. (1967). Perceived reference group support: Racial attitudes and overt behavior. American Sociological Review, 32, 960-970.

Fisher, G. A. (1988). Problems in the use and interpretation of product variables. In. J. S. Long (Ed.), Common problems/proper solutions: Avoiding error in quantitative research (pp. 84-107). Newbury Park, CA: Sage.

Grube, J. W., McGree, S., & Morgan, M. (1984). Smoking behaviors, intentions, and beliefs among Dublin primary school children. Economic and Social Review, 15, 265-288.

Grube, J. W. & Morgan, M. (1986). Smoking, drinking and other drug use among Dublin post-primary school pupils. Dublin, Ireland: The Economic and Social Research Institute.

Grube, J. W., Morgan, M., & McGree, S. (1986). Attitudes and normative beliefs as predictors of smoking intentions and behaviours: A test of three models. British Journal of Social Psychology, 25, 81-93.

Hansen, W. B., Malotte, C. K., & Fielding, J. E. (1985). The bogus pipeline revisited: The use of threat of detection as a means of increasing self-reports of tobacco use. Journal of Applied Psychology, 70, pp.789-792.

Liska, A. E. (1974). The impact of attitude on behavior: Attitude-social support interaction. Pacific Sociological Review, 17, 83-97.

Liska, A. E. (1984). A critical examination of the causal structure of the Ajzen/Fishbein attitude-behavior model. Social Psychology Quarterly, 47, 61-74.

Mardsen, P. V. (1981). Conditional effects in regression models. In P. V. Mardsen (Ed.), Linear models in social research (pp. 97-116). Beverly Hills, CA: Sage.

Murray, D. M. & Perry, C. (1987). The measurement of substance use among adolescents: When is the 'bogus pipeline' method needed? Addictive Behaviors, 12, 225-233.

Rabow, J., Neuman, C. A., & Hernandez, A. C. R. (1987). Contingent consistency in attitudes, social support and the consumption of alcohol: Additive and interactive effects. Social Psychology Quarterly, 50, 56-63.

Schuman, H. & Johnson, M. P. (1976). Attitude and behavior. Annual Review of Sociology, 2, 161-207.

Susmilch, C. E., Elliot, G. C., & Schwartz, S. H. (1975). Contingent consistency and the attitude-behavior relationship: A comment. American Sociological Review, 40, 682-686.

Triandis, H. C. (1980). Values, attitudes and interpersonal behavior, in H. E. Howe & M. M. page (Eds.), Nebraska symposium on motivation 1979 (pp. 195-259), Lincoln, NE: University of Nebraska.

Warner, L. G. & DeFleur, M. L. (1969). Attitude as an interactional concept: Social constraints and social distance as intervening variables between attitude and action. American Sociological Review, 34, 152-169.

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Footnotes

[1]Another frequently offered interpretation of contingent consistency interactions is that attitudes will be expressed behaviorally only in the presence of perceived social support. This dependence can be demonstrated by simply rearranging equation 2 as follows:

$$B = (\underline{w}_1 + \underline{w}_3 NB)A + \underline{w}_2 NB \qquad (2a).$$

It can be seen from this equation that the relationship between attitude and behavior is contingent not only upon $\underline{w}_1$, but also NB and $\underline{w}_3$ (cf. Fisher, 1988; Mardsen, 1981).

[2]Irish post-primary schools approximate grades 8-12 in American school systems. They grant two types of degrees by examination: an intermediate certificate after three years of schooling and a leaving certificate after five years. Secondary schools focus on an academic curriculum and are state subsidized private institutions. They are run by religious orders or an independent board of governors. Vocational schools are similar to secondary schools in structure, but more emphasis is placed on non-academic subjects and technical training. Comprehensive and community schools are run by local boards and combine academic and technical training.

[3]The somewhat higher absentee rate at the second session appears to be due to the fact that data collection preceded a school holiday.

[4]The statistical significance of the increase in $\underline{R}^2$ was ascertained by applying the following F-test: $\underline{F} = [(\underline{R}^2_f - \underline{R}^2_r)/(\underline{k}_f - \underline{k}_r)]/[(1 - \underline{R}^2_f)/(\underline{N} - \underline{k}_f - 1)]$, where $\underline{R}^2_f$ is the variance explained by full (interactive) model, $\underline{R}^2_r$ the variance explained by the restricted (additive) model, and $\underline{k}_r$ and $\underline{k}_f$ are the number of parameters to estimated in the two models, respectively. It should be noted that this test is a valid and invariant indicator of the overall significance of the interaction effects, even if the independent variables are ordinal rather than interval (cf. Bagozzi & Schnedlitz, 1985).

[5]It should be noted that the coefficients associated with main effects are scale dependent and arbitrary when product terms are included in a regression analysis. Therefore, they should not be interpreted. However, the coefficients associated with the interactions are invariant to linear transformations and can be interpreted (cf. Fisher, 1988).

Table 1

Perceived Disapproval of Smoking, Drinking, and Drug Use by Parents and Peers

Significant Other	Behavior			$\chi^2(2)$	η^2
	Smoking	Drinking	Drug Use		
Mother	2.24	2.20	1.56	602.97*	.15
Father	2.21	2.22	1.57	545.37*	.14
Best Friend	2.36	2.35	1.30	1518.07*	.37
Other Friends	2.38	2.32	1.30	1485.82*	.36

Note: A lower score indicates greater disapproval. The test statistic is Friedman's one-way analysis of variance on ranks.

*$p < .001$

Table 2

Perceived disapproval of smoking, drinking, and drug use for three age groups

Significant Other	Age Group			$\chi^2(2)$	η^2
	< 14	15-16	> 17		
		Smoking			
Mother	1161.4	1558.1	1786.2	300.90**	.10
Father	1174.7	1516.7	1724.7	240.76**	.08
Best Friend	1229.5	1582.7	1587.1	146.73**	.05
Other Friends	1195.3	1601.4	1606.0	215.83**	.07
		Drinking			
Mother	1108.0	1392.4	1864.4	414.06**	.15
Father	1095.6	1389.9	1778.4	346.65**	.13
Best Friend	1046.2	1512.0	1721.8	399.90**	.15
Other Friends	1053.7	1525.2	1702.7	407.80**	.15
		Drug Use			
Mother	1362.5	1401.8	1383.2	7.56*	< .01
Father	1340.9	1373.1	1366.1	5.40	< .01
Best Friend	1274.2	1439.9	1461.7	36.22**	.01
Other Friends	1258.0	1458.3	1454.5	44.04**	.01

Note: A lower score indicates greater disapproval. The test statistic is Kruskal-Wallis one-way analysis of variance on ranks.

*$p < .05$ **$p < .001$

Table 3

Summary of Predictions

of Smoking, Drinking and Drug Use

Age Group	R^2 Additive Model	R^2 Interactive Model	R^2 Increase	F Increase	df
		Smoking			
<14	.258	.319	.061	24.24*	4, 1088
15-16	.444	.535	.091	52.73*	4, 1083
>17	.465	.501	.036	11.25*	4, 612
		Drinking			
<14	.286	.328	.042	16.48*	4, 1031
15-16	.327	.373	.046	19.61*	4, 1064
>17	.399	.435	.036	9.26*	4, 584
		Drug Use			
<14	.355	.368	.013	7.28*	3, 1056
15-16	.442	.499	.057	40.18*	3, 1071
>17	.457	.538	.081	34.54*	3, 588

* $p < .001$

Table 4

Regression Coefficients From Final Model

Predicting Smoking

Predictor	b	SE b	ß	t
	< 14 years old (n = 1098)			
Attitude	.49	.079	.19	6.24***
Parental Approval	.15	.088	.05	1.67
Peer Approval	-.11	.059	-.06	-1.83
Parental Smoking	.11	.042	.07	2.60
Peer Smoking	.68	.071	.28	9.56***
Attitude x Parental Approval	.14	.077	.05	1.81
Attitude x Peer Approval	-.09	.065	-.04	1.43
Attitude x Parental Smoking	.01	.042	.01	.32
Attitude x Peer Smoking	.59	.066	.27	8.95***
	15-16 years old (n = 1093)			
Attitude	.81	.079	.26	10.33***
Parental Approval	.26	.072	.08	3.69**
Peer Approval	.16	.101	.04	1.58
Parental Smoking	.15	.045	.07	3.29**
Peer Smoking	1.07	.070	.38	15.14***
Attitude x Parental Approval	.12	.092	.04	1.36
Attitude x Peer Approval	.19	.064	.07	2.89*
Attitude x Parental Smoking	.12	.039	.06	3.08**
Attitude x Peer Smoking	.67	.061	.26	10.99***

(table continues)

Predictor	b	SE b	ß	t
	>17 years old (n = 629)			
Attitude	1.57	.139	.39	11.27***
Parental Approval	.55	.124	.14	4.45***
Peer Approval	-.47	.194	-.09	-2.43
Parental Smoking	.20	.085	.07	2.30
Peer Smoking	1.13	.120	.31	9.37***
Attitude x Parental Approval	.15	.102	.05	1.52
Attitude x Peer Approval	-.21	.164	-.04	-1.30
Attitude x Parental Smoking	.07	.067	.03	1.07
Attitude x Peer Smoking	.58	.100	.18	5.87***

Note: Probability levels are protected using the Bonferroni procedure.

*p < .05 **p < .01 ***p < .001

Table 5

Regression Coefficients From Final Model

Predicting Drinking

Predictor	b	SE b	ß	t
	< 14 years old (n = 1041)			
Attitude	.24	.032	.24	7.43***
Parental Approval	.04	.044	.03	.82
Peer Approval	.02	.027	.02	.65
Parental Drinking	.06	.031	.05	1.86
Peer Drinking	.34	.052	.22	6.45***
Attitude x Parental Approval	.03	.032	.04	1.05
Attitude x Peer Approval	.05	.022	.07	2.25
Attitude x Parental Drinking	.04	.026	.04	1.55
Attitude x Peer Drinking	.21	.037	.19	5.66***
	15-16 years old (n = 1074)			
Attitude	.39	.039	.32	9.96***
Parental Approval	.08	.036	.07	2.26
Peer Approval	.02	.053	.01	.33
Parental Drinking	.07	.035	.05	2.07
Peer Drinking	.46	.048	.29	9.49***
Attitude x Parental Approval	.01	.032	.01	.24
Attitude x Peer Approval	.02	.035	.02	.57
Attitude x Parental Drinking	.05	.029	.04	1.60
Attitude x Peer Drinking	.29	.040	.21	7.22***

(table continues)

Predictor	b	SE b	ß	t
	>17 years old (n = 594)			
Attitude	.59	.060	.39	9.82***
Parental Approval	.14	.043	.11	3.25*
Peer Approval	-.06	.120	-.03	-.52
Parental Drinking	-.01	.055	-.01	-.27
Peer Drinking	.67	.067	.36	9.88***
Attitude x Parental Approval	.04	.039	.04	1.11
Attitude x Peer Approval	.00	.065	.00	.06
Attitude x Parental Drinking	.07	.050	.05	1.36
Attitude x Peer Drinking	.31	.059	.18	5.18***

Note: Probability levels are protected using the Bonferroni procedure.

*p < .05 **p < .01 ***p < .001

Table 6

Regression Coefficients From Final Model

Predicting Drug Use

Predictor	b	SE b	ß	t
	< 14 years old (n = 1064)			
Attitude	.17	.027	.17	6.05***
Parental Approval	.39	.069	.14	5.58***
Peer Approval	-.05	.022	-.06	-2.23
Peer Drug Use	.68	.039	.49	17.37***
	15-16 years old (n = 1079)			
Attitude	.17	.025	.19	6.78***
Parental Approval	.06	.069	.03	.84
Peer Approval	.03	.020	.04	1.41
Peer Drug Use	.30	.037	.27	8.32***
Attitude x Parental Approval	.08	.033	.07	2.27
Attitude x Peer Approval	.03	.015	.05	1.91
Attitude x Peer Drug Use	.16	.020	.28	8.37***

(table continues)

Predictor	b	SE b	ß	t
	>17 years old (n = 596)			
Attitude	.11	.027	.15	4.25***
Parental Approval	.19	.062	.10	3.06*
Peer Approval	.04	.022	.07	1.89
Peer Drug Use	.17	.054	.18	3.19*
Attitude x Parental Approval	.22	.034	.21	6.41***
Attitude x Peer Approval	.06	.017	.12	3.27*
Attitude x Peer Drug Use	.09	.026	.21	3.51**

Note: Probability levels are protected using the Bonferroni procedure.

*p < .05 **p < .01 ***p < .001